

# Book Reviews

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## **Design and Analysis of Shell Structures**

M. Farshad, Kluwer, Dordrecht, The Netherlands, 1992, 415 pp., \$148.00.

This book is intended primarily as a textbook for a graduate-level course for majors in aerospace, architectural, civil, materials, and mechanical engineering. A secondary use is as a reference/design analysis manual for practicing structural engineers. Probably its most unusual features are its treatment of concrete cylindrical shell roofs and RC (reinforced concrete) domes, hypar (hyperbolic paraboloid) shells, and folded plate structures.

After an introductory chapter and a very brief general theoretical treatment, there are chapters on membrane and bending analyses of circular cylindrical shells, design of concrete cylindrical shell roofs, membrane and bending analyses of axisymmetric shells, design of RC domes, a very brief chapter on shells of arbitrary geometry, design of hypar shells, analysis and design of folded plates, design of liquid containers, and a final chapter on buckling of shells.

The major strengths of this book are its design tables and the problems presented at the end of each chapter except the first two. Its style is similar to *Stresses in*

*Shells* by W. Flügge (Springer-Verlag, 1960), but its coverage of shells is limited to isotropic materials (except RC) and is thus deficient relative to *Thin Elastic Shells* by H. Kraus (Wiley, 1967). Finally, its aerospace applications are nil.

Although there are references at the end of each chapter, all but less than half a dozen of them are to books and design guides rather than papers. The size of print on the figures and the figure quality in general are below acceptable standards.

This reviewer does not recommend this book, since it falls far short of its objective. For the novice, *Analysis of Shells and Plates* by P. L. Gould (Springer-Verlag, 1988), reviewed in this column in 1990 (Vol. 28, No. 3, pp. 574-576) is recommended, while the more serious shell analyst would do well to try to obtain a copy of the aforementioned book by Kraus, now out of print.

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## **Finite Element Analysis of Composite Laminates**

O. O. Ochoa and J. N. Reddy, Kluwer, Dordrecht, The Netherlands, 1992, 206 pp., \$100.00.

Rapid advancements in structural composites technologies spur a need for analytical techniques that are capable of providing means to achieve an efficient design. In the past decade, extensive research efforts in both analyses and experiments toward understanding structural response as well as its failure mechanism have provided guidelines for design. Most of the currently available books emphasize the areas of mechanics of composite materials but are focussed in the area of finite element analysis. This book, by Ochoa and Reddy, is believed to be the first effort in the interdisciplinary areas of finite element analysis and composite materials.

The title of the book clearly defines a scope that aims at finite element analysis in composite laminates rather than at composite structures. The authors focus on fundamental aspects of finite element modeling of composite laminates for understanding and predicting the response of composite structures.

This book contains five chapters. The first chapter covers a brief overview of the difference in design of structures using conventional isotropic materials and those using composite materials. Chapter two concisely provides the necessary background in the anisotropic constitutive equation of composite materials and plate theories. Chapter three presents the formulation of finite element

modeling based upon laminated plate theories. An evaluation of approaches to predict the structural response of composite laminates is also included. Descriptions of the damage process and failure criteria in composite laminates are included in Chapter four. The last chapter covers case studies of several laminate configurations that typically occur in composite structures. Those cases involve laminates with loaded and open cutouts, woven composites, environmental effects of laminates, and postbuckling response and failure of laminates.

This book reflects the authors' many years of experience in finite element modeling of composite materials. The book is useful, well written and includes adequate references at the end of each chapter to lead the reader to more detailed information. Perhaps it would be convenient to readers if the page numbering would be placed in the outer corner of the page instead of the inner corner.

In short, this book is suitable for those who are new to the fields of either finite elements or composite materials or both. The book is highly recommended for use as an advanced undergraduate/beginning graduate text and reference for both researchers and practicing engineers.

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